

EXTRACTION OF OIL & PRODUCTION OF BIODIESEL FROM HEMP SEED AS A FEEDSTOCK AND ANALYSE THE PERFORMANCE, EMISSION & COMBUSTION CHARACTERISTICS RUNNING ON CI ENGINE AT DIFFERENT INJECTION TIMINGS.

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Keywords:

Brake Specific Fuel Consumption (BSFC), Brake Thermal Efficiency (BTE), Brake Specific Energy Consumption (BSEC), Hydrocarbon (HC), Hemp Oil Methyl Ester.

Introduction:

The world is been running on fossil fuels, crude oil for energy generation in power plants and transport sectors and these are non-renewable sources of energy obtained from the nature.

These resources are not going to be there for a long period of time, Depletion rate is nearing day by day and other problems like high price for fuel, foreign import/export of crude oil are being faced now.

The modern generation is all about finding alternative sources of fuel like the conventional ones, and also to have a sustainable fuel to reduce emissions, Researches are being done and different fuels are being discovered, One such most demanding and popular fuel is Biodiesel. Since biodiesel is naturally obtained from natural organic products like Sunflower, Jatropha, Pongamia pinnata, Hazelnut, Babassu, Argon, Coconut oil, Waste cooking oil etc. These are renewable sources of fuel, biodegradable, nontoxic and containing minor amount of Sulphur in them. Furthermore its amazing low HC and CO emissions factor is also beneficial for the environment.

Researches have been done across the world and after investigation and experiments it's found that selective amounts of biodiesel blend with diesel fuel gives good yield which is quite similar to the C.I. engine running on a diesel fuel the performance characteristics and other features are comparable to an extent.

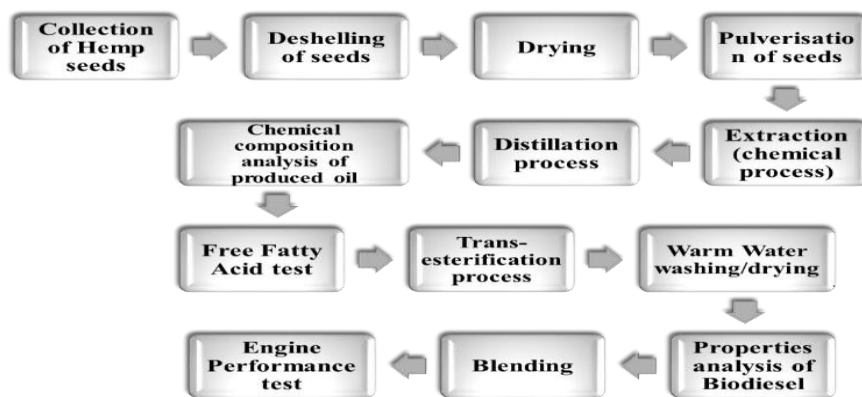
Objectives:

1. To extract Hemp oil from deshelled hemp seeds, conduct FFA test and trans-

esterified into biodiesel that is hemp oil methyl ester.

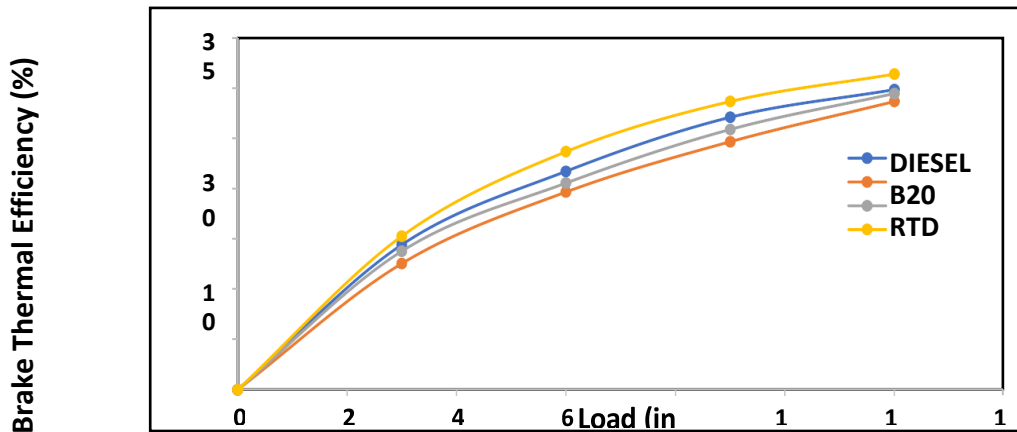
2. To do Property test like Flash & Fire point, Calorific value, Density and Viscosity for B100 blend trans-esterified biodiesel.
3. To analyze the performance characteristics in a single cylinder 4 stroke compression ignition engine at 200 bar pressure, And also to do combustion, efficiency and emission evaluation.
4. To analyze the Effect of injection timing on the performance by varying injection timings (18.5° , 23.5° , 28.5°).
5. To determine the emission rates of carbon monoxide (CO), carbon dioxide (CO₂), hydrocarbon (HC), oxides of nitrogen (NO_x), oxygen, and smoke opacity and evaluate the emission characteristics.

Methodology:

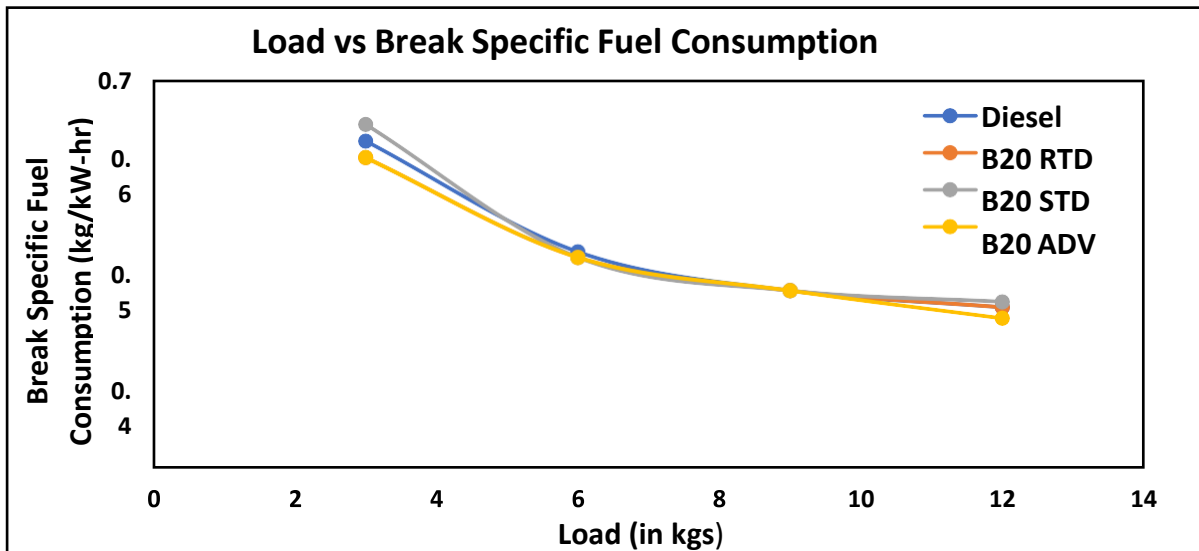


1. Collection of Hemp seeds.
2. Deshelling of Hemp seeds.
3. Drying.
4. Pulverisation of seeds.
5. Extraction (chemical process).
6. Distillation process.
7. Chemical Composition analysis of produced oil.
8. Free Fatty Acid test.
9. Trans-Esterification process
10. Water washing & drying.
11. Property analysis of Biodiesel (B100 Blend).
12. Blending (80:20).
13. Engine Performance test.

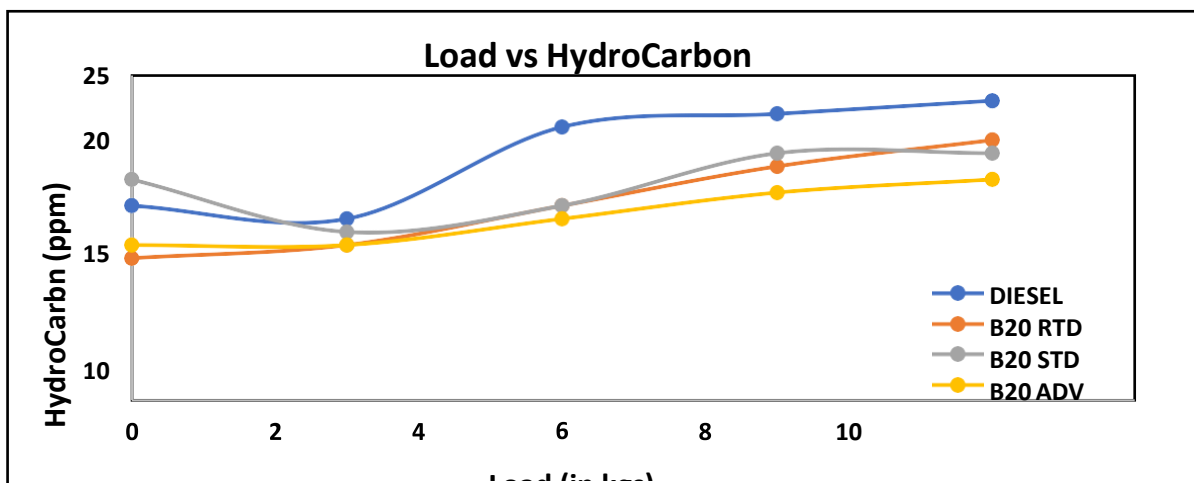
Results:



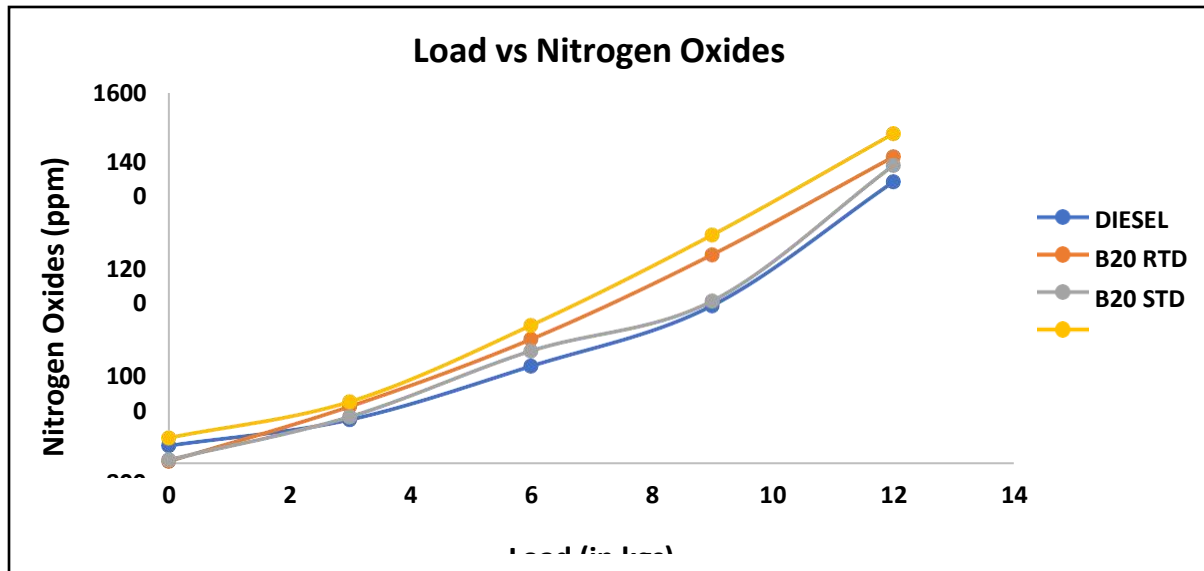
The above graph is representation of Load vs Brake thermal efficiency. As the load increases the BTE increases, B20 ADV has the highest increment.



The above graph is representation of Load vs Brake Specific Fuel Consumption. As the load increases the BSFC decreases, B20 ADV has the most decrement.



The above graph is representation of Load vs HydroCarbon Emission. It is observed that Hydrocarbons emission is less than diesel oil.



The above graph is representation of Load vs Nitrogen Oxides Emission. It is observed that Nox emissions are more compared to diesel oil.

Conclusion:

The following properties of B100 blend was:

1. Calorific value was found to be 36,600kJ/kg.
2. Density 885kg/m³.
3. Viscosity was 4.00mm²/sec.
4. Flash point at 176°C & Fire point at 180°C.
5. Three injection variation setting was done, that is for 18.5° Retarding timing, 23.5° Standard timing, 28.5° Advancing timing. Compared to diesel as shown in graph above the plot remains similar to diesel fuel in properties like Load vs BTE and Load vs BSFC. HC level is slightly high when compared to diesel although NO_x levels are pretty low in comparison.

Future Scope:

Experimentations can be conducted

1. Varying the blends level.
2. Adding nanoparticles.
3. Varying the injection pressure.
4. Varying the compression ratio.